Original Paper

Effect of a Nursing Care Program Based on King's Theory of Goal Attainment on the Self-efficacy of Diabetic Patients

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A B S T R A C T

Introduction: In managing diabetes, the self-efficacy of patients for self-care and adherence to treatment is important. One of the nursing theories that can lead to patients' participation in care is King's theory of goal attainment.

Objective: This study aims to investigate the effect of a nursing care program based on the theory of goal attainment on the self-efficacy of patients with diabetes.

Materials and Methods: This quasi-experimental study was conducted on 60 patients with type 2 diabetes admitted to the endocrinology departments of two hospitals in Tehran, Iran. They were randomly assigned to two intervention (n=30) and control (n=30) groups. The data were collected using a sociodemographic/clinical form, the diabetes management self-efficacy scale (DMSES), and the goal attainment scaling (GAS). The intervention group received the nursing care program based on King's theory. The self-efficacy of the patients was measured before, two weeks after (post-test), and two months after (follow-up) the intervention. Chi-square, paired t-test, independent t-test, and repeated measures ANOVA were used for data analysis.

Results: Most of the participants were female (68%) and married (71%), and illiterate (30%) in the age group of 51-60 years (43%). Before the intervention, the DMSES score was 144.10±14.13 in the intervention group and 139.63±13.46 in the control group. Two weeks after the intervention, the scores were 162.26±8.97 and 137.36±13.29, respectively. Two months after the intervention, the scores were 166.5±8.16 and 136.96±11.8, respectively. There was a statistically significant difference in the two groups in the post-test and follow-up phases, compared to the pre-test phase (P=0.001). The difference was also significant between the two groups after intervention (P=0.001). According to repeated measures ANOVA results, the effect of time (P=0.001, $\eta^2=0.438$) and the interaction effect of time and group (P=0.001, $\eta^2=0.538$) in the intervention and control groups were significant.

Conclusion: The nursing care program based on the theory of goal attainment can improve diabetic patients' self-efficacy two weeks and two months after implementation. The theory of goal attainment can be used in care programs for diabetic patients.

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Highlights

● The nursing care program based on the theory of goal attainment can improve diabetic patients' self-efficacy two weeks after implementation.

● The nursing care program based on the theory of goal attainment can improve diabetic patients' self-efficacy two months after implementation.

● The theory of goal attainment can be used in care programs for diabetic patients.

Plain Language Summary

Diabetes is a prevalent chronic disease in Iran. Patient participation in the care process and improving their self-efficacy can be very effective. Patient-centered care and facilitating the relationship between the patient and the nurse are very useful in managing diabetes. The results of this study showed that the nursing care intervention based on King's theory of goal attainment was able to help diabetic patients identify their problems and improve the mutual goals between the nurse and the patient through systematic care. The intervention led to improved self-efficacy in diabetic patients.

Introduction

Diabetes is one of the most common and serious metabolic diseases and also one of the major health concerns in the world [1, 2]. According to the statistics of the World Health Organization (WHO), people in Asia and the Middle East are at higher risk for diabetes, and 80% of diabetic patients live in developing countries [3]. According to the WHO report, the overall prevalence of diabetes in Iran in 2020 was 10.3%, where obesity (24.9%), lack of physical activity (31.9%), and overweight (60.5%) were the main risk factors for diabetes [4]. This disease is not curable but can be managed [5]. Successful prevention and management of diabetes complications require preventive and therapeutic measures. This is possible if the patient actively participates in the treatment process and follows the physicians' recommendations, or has self-efficacy [6, 7].

Patient-centered approach (focuses on patient empowerment) and community-centered approach (moves care from the hospital into the community) are two attractive approaches to health [8, 9]. Both approaches seek to empower patients to adopt self-care behaviors by providing them with the support and care they need outside of clinical settings such as hospitals and clinics [10]. Imogene King's theory of goal attainment is one of the most important nursing models as it comprehensively and deeply addresses patient participation and interaction in the treatment process [11]. This model proposes three interacting systems: Person-al, interpersonal, and social [12]. The personal system includes patients, nurses, and their understanding [11]. In patients with chronic diseases, the disease complications change the perception of life. The personal system focuses on helping them adapt to these changes [13]. The interpersonal system, the most important concept of the theory, consists of the concepts of communication, interaction, stress, and role [11]. Considering the considerable effects of chronic diseases on stress and the role of the patient, appropriate communication between the patient and the physician and their active interactions in this process are necessary for the patient's physical and psychological health [14]. The social system includes the decision-making process [11]. This process is critical in treating and caring for patients with chronic diseases such as diabetes [13]. Therefore, the theory of goal attainment facilitates patient-centered and family-centered care by providing a framework for establishing a mutual and therapeutic relationship between nurses and patients based on their mutual understanding [15]. Based on this theory, the nurse systematically and thoroughly examines the patient using interviews, observations, and examinations and then determines the goals (the patient's problems) after reaching an agreement with the patient. The nurse and the patient then try to achieve the goals through interactions [16, 17].

King's theory of goal attainment is an effective approach to nursing practice in various situations [18, 19], because it reduces the risk of poor communication, lowers stress during care, establishes more targeted nurse-patient relationships, facilitates patients' adaptation to

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hospital discharge and nursing care plans [20, 21], and hence gives the patients a chance to better know their bodies and its functioning in terms of time and place [22]. Many studies in different countries have used the concepts of the goal attainment theory in nursing, but it has been neglected in Iranian studies [16, 17, 21, 23]. In addition, given the importance of evidence-based practice in providing care for patients with chronic conditions, and considering the fact that few studies have examined the application of King's theory of goal attainment in promoting self-efficacy of diabetic patients, this study aims to investigate the effect of applying King's theory of goal attainment on self-efficacy in patients with type 2 diabetes in Iran.

Material and Methods

This quasi-experimental study was conducted on 60 eligible patients with type 2 diabetes admitted to the endocrinology departments of two hospitals affiliated with Shahid Beheshti University of Medical Sciences in Tehran, Iran, who were selected using a convenience sampling method. After signing an informed consent form, they were randomly assigned to the intervention and control groups (30 per group) using a table of random numbers. In this table, even numbers were considered for the intervention group and odd numbers were considered for the control group. To prevent data leakage between the two groups, the single-blinding method was used, and the patients did not know which group they were in.

In this study, the required sample size was determined at a confidence interval of 95% (error rate of 5%), a test power of 95%, and an effect size of 1 using the formula of comparison of two means and based on the study of Feghhi et al. [24] who put 24 people in the control group and 24 people in the intervention group. In this regard, the sample size was calculated as 30 per group.

The inclusion criteria were the diagnosis of type 2 diabetes (in the past year by a physician), Persian speaking, ability to interact with the researcher, adherence to the treatment plan, and having no mental disability (e.g. mental or cognitive disorders that could prevent the patients from participating in the decision-making process). The exclusion criteria were participation in non-routine educational programs or similar studies during the current study and inability to continue participation in the study for any reason. If a patient could not participate in all intervention sessions, the sessions were rescheduled or performed intensively for them; otherwise, s/he would be excluded from the study. Sampling

was done in the morning and evening shifts (at least three days per week).

The data were collected using a sociodemographic/clinical form, the diabetes management self-efficacy scale (DMSES), and the goal attainment scaling (GAS). The sociodemographic/clinical form surveyed age, gender, marital status, educational level, economic status, duration of diabetes, and family history of diabetes. The DMSES is a 20-item instrument with four subscales: Diet and nutrition (9 items), medication and leg examination (3 items), physical activity (3 items), and medical care (5 items). The items are scored on an 11-point Likert scale ranging from 1 (not at all confident) to 10 (totally confident). The total score ranges from 20 to 200, with higher scores indicating greater self-efficacy. The DMSES was used because it has been translated and psychometrically evaluated in Iran by the Mohammadi-Nejad et al. study [23]. In our study, the internal consistency of this scale was investigated by randomly distributing the questionnaire among 30 diabetic patients (who were not among the participants) and a Cronbach's α of 0.89 was obtained. The GAS was designed in 1998 by the King international nursing group based on King's theory of goal attainment and has been used in other studies [16, 25]. The GAS lists each patient's care goals based on three systems (personal, interpersonal, and social), specifies the expected outcomes for each patient based on their conditions and priorities, and measures how well a patient attains a specific goal. The items are scored on a five-point Likert scale from -2 to +2: Achievement of much less than expected goal (-2), achievement of somewhat less than expected goal (-1), achievement of a goal (0), achievement of somewhat more than expected goal (1), and achievement of much more than expected goal (2). We translated the GAS into Persian and then back-translated it into English after obtaining permission from the scale developer. In the next step, a panel of experts (15 professors from Shahid-Beheshti University of Medical Sciences) determined the "relevance", "unambiguity", and "simplicity" of the items by rating them on a Likert scale. After confirming the content validity of the Persian version, its test-rested reliability was confirmed with an intraclass correlation coefficient of 0.93. The DMSES was completed before intervention, two weeks after, and two months after by the researcher (at a time appropriate for the patients) by the face-to-face method or through the phone (if the patients were discharged from the hospital).

The control group received routine care and training in the ward. In addition to the routine nursing care and training, the intervention group participated in a nursing
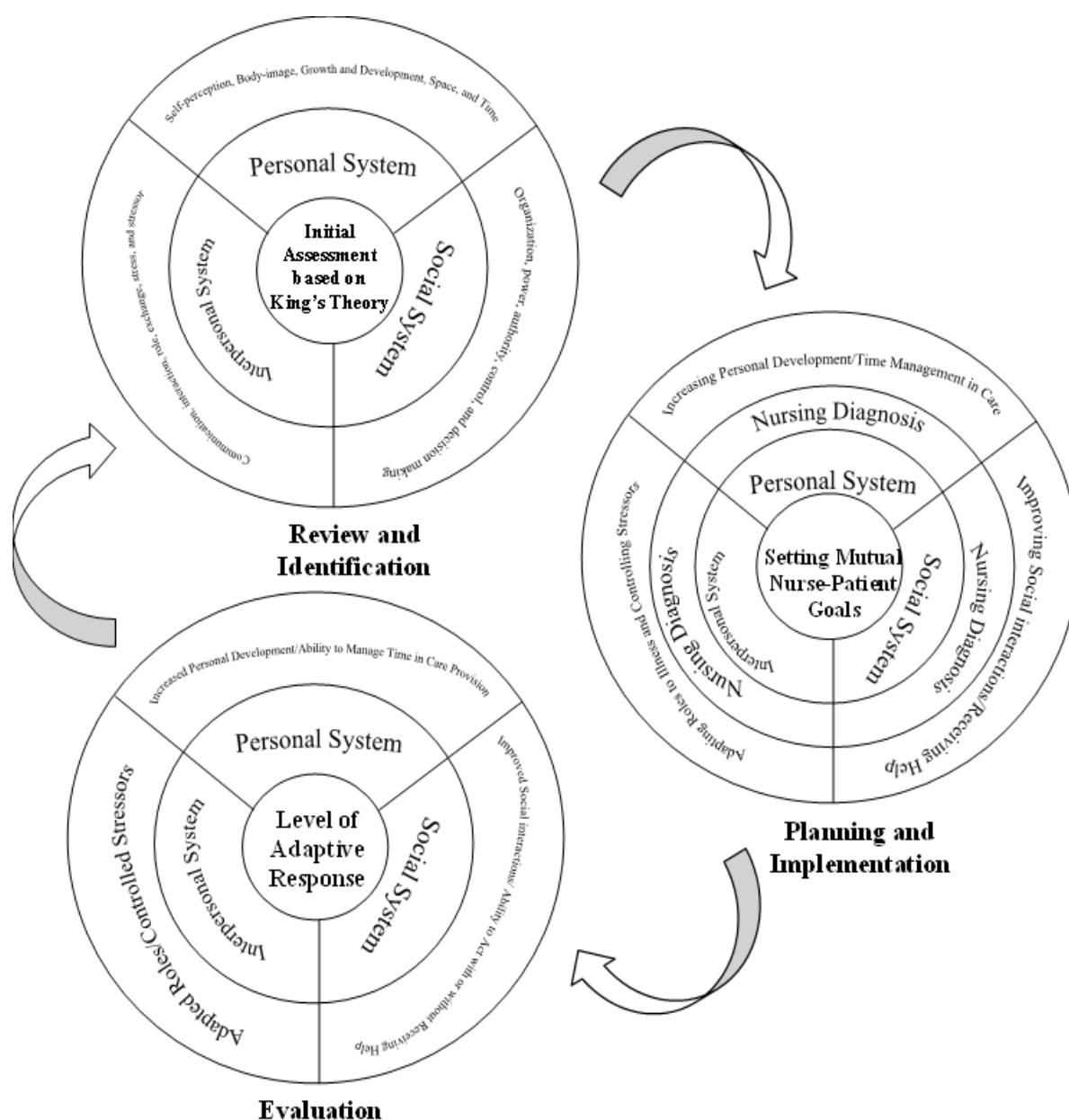
Figure 1. Flowchart of the nursing care protocol based on King's theory

care program developed based on King's theory of goal attainment. The priorities of the patient's care needs based on King's three interactive systems were first examined by the GAS. Mutual goal setting was achieved after implementing a nursing care protocol for each patient separately. Three main mutual goals or criteria were determined to measure each patient's problems. The "personal," "interpersonal," and "social" systems included the criteria of "increasing personal development and time management in care," "adapting roles and controlling stressors," and "improving social interactions and receiving help," respectively. After setting goals, the nursing care program was implemented for ten consecutive days, where the patients were taught

how to adapt their roles to the disease and were asked to practice the methods. The duration of the intervention was ten days, according to Vincent's study [27]. The training was conducted once a day, each session for 20 minutes individually and face to face in the hospital or through the phone for the patients at home. Patients were also given educational booklets. Figure 1 shows a flowchart of the nursing care protocol developed based on King's theory of goal attainment to help diabetic patients with major personal, interpersonal, and social problems to improve their adaptive response [27].

The SPSS software, version 20 was used for data analysis. Chi-square test was used to compare the two
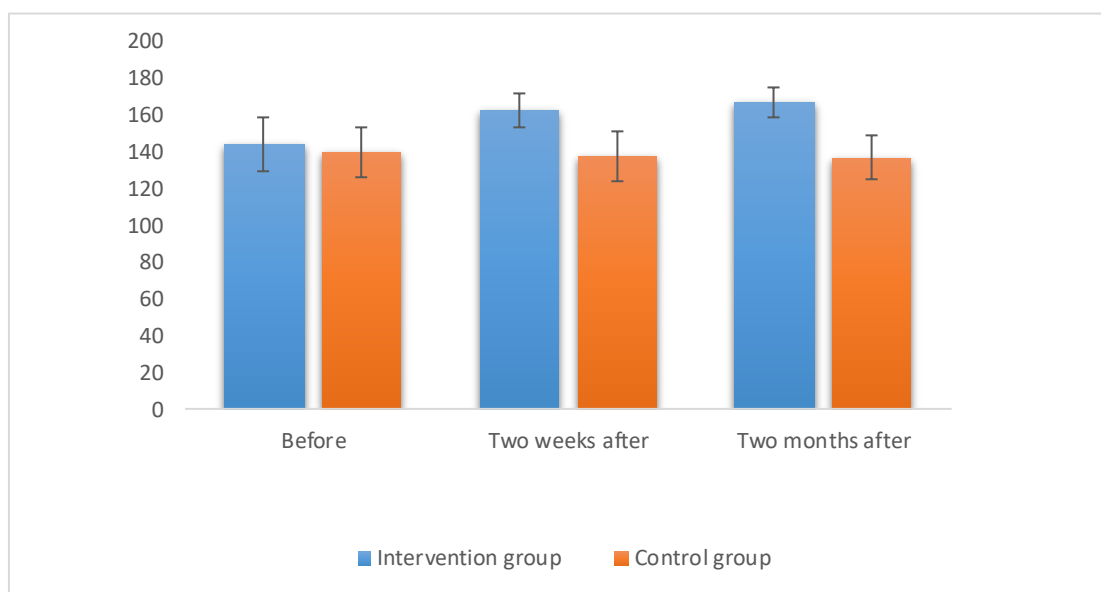
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Figure 2. The changes in the mean DMSES scores in the two groups at three time points

groups in terms of sociodemographic/clinical characteristics. Also, independent t-test, paired t-test, and repeated measures ANOVA were used to compare the DMSES score. Before conducting ANOVA, the Box's M test, Mauchly's sphericity test, Levene's test, and Kolmogorov-Smirnov test were performed to examine the assumptions of the equality of variance-covariance matrices, sphericity, homogeneity of the variances, and normality of the data distribution. The results of the Box's M test showed that the variance-covariance matrices were not homogeneous. In the Mauchly's sphericity test, the estimated epsilon (ε) and P were 0.75 and 0.05, respectively; thus, the assumption of sphericity was rejected. Therefore, the Greenhouse-Geisser test was used to correct this violation.

Results

Most of the participants were in the age range of 51-60 (40% in the intervention group and 46.7% in the control group). In addition, the majority of them were female (70% in the intervention group and 66.7% in the control group), married (63.3% in the intervention group and 80% in the control group), with moderate socioeconomic status (60% in the intervention group and 53.3% in the control group) and illiterate (30%). Using the chi-square test was showed there was no significant difference in terms of individual and social variables. Moreover, most patients had been diagnosed with diabetes 5-10 years ago (26.7% in the intervention group and 70% in the control group) and had a family history

of diabetes (83% in the intervention group and 67% in the control group).

The mean DMSES score in the intervention group increased from 144.1±14.13 to 162.26±8.97 two weeks after the intervention. In the control group, the mean DMSES score was 139.63±13.46 before the intervention, and did not change significantly after the intervention. Two months after the intervention, the mean DMSES score of the intervention group (166.50±8.16) was higher than that of the control group. It was also higher than the mean post-test score (two weeks after the intervention), suggesting that the nursing care program increased the self-efficacy of patients over time (Table 1). Figure 2 compares the mean DMSES scores of the two groups before, two weeks after, and two months after the intervention.

Results showed no significant difference between the two groups in the DMSES score before the intervention. However, significant differences were observed between them two weeks after (P=0.001) and two months after (P=0.001) the intervention (Table 2).

Table 3 shows the results for the pairwise comparison of three assessment phases using the paired t-test. There were a significant difference in the mean DMSES score in the intervention group between pre-test and post-test (P=0.001), and between pre-test and follow-up (P=0.001) phases.

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Table 1. The mean DMSES scores of patients in two groups at three time points

Time	Group	Mean±SD	SE	P*
Pre-test	Intervention	144.1±14.13	2.57	0.058
	Control	139.63±13.46	2.45	
Post-test (two weeks after)	Intervention	162.26±8.97	1.63	0.001
	Control	137.36±13.29	2.42	
Follow-up (two months after)	Intervention	166.5±8.16	1.49	0.001
	Control	136.96±11.8	2.15	

Abbreviations: SD: Standard deviation; SE: Standard error; DMSES: Diabetes management self-efficacy scale.

*Paired t-test.

The repeated measures ANOVA was used to further examine the interaction effects of time (measurement phase) and group on the DMSES score. As shown in Table 4, the results showed that the effect of time and the interaction effect of time and group were significant (P=0.001). In other words, the improvements in DMSES score were significant two weeks and two months after the intervention in the intervention group compared to the control group.

Discussion

This study used King's theory of goal attainment to determine three main nurse-patient interaction systems (personal, interpersonal, and social) for improving the self-efficacy of patients with type 2 diabetes. The personal, interpersonal, and social systems included the goals of "increasing personal development and time management in care," "adapting roles to disease and controlling stressors," and "improving social interactions and receiving help," respectively. A systematic review of studies on the effectiveness of nursing interventions based on King's theory has shown that 40% of studies have used the theory in educational fields and 60% in the clinical field. The review study suggested that King's proposed systems and theory can provide a valuable approach for nurses facing complex health care situations in the hospitals [26]. The results of the present study are consistent with this study and confirm that King's goal attainment theory is a suitable model to guide professional nursing care which supports patients, respects their rights (social system), emphasizes their health rights (individual system) and ensures participation in health care practices (interpersonal system).

The results of this study indicated that the nursing care program based on the goal attainment theory significantly increased the self-efficacy (DMSES score) in the intervention group compared to the control group, and after intervention (two weeks after) compared to the pre-intervention phase. In addition, the self-efficacy in the intervention group increased significantly two months after the intervention (follow-up) compared to the pre-intervention phase.

Table 2. Comparison of the DMSES scores between the two groups at three time points

Phases	Mean Difference	95% CI Lower, Upper	P*
Before	4.46	2.66, 11.6	0.215
Two weeks after	24.9	19.03, 30.76	0.001
Two months after	28.86	23.82, 33.91	0.001

DMSES: Diabetes management self-efficacy scale.

*Independent t-test.

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Table 3. Pairwise comparison of three assessment phases for the DMSES score in the study groups

Group	Phases	Mean Difference	95% CI	P*
			Lower, Upper	
Intervention	Pre-test-post-test	18.16	13.41, 22.92	0.001
	Pre-test-follow-up	22.4	17.54, 27.25	0.001
Control	Pre-test-post-test	2.26	0.032, 4.56	0.053
	Pre-test-follow-up	2.01	0.077, 4.07	0.059

DMSES: Diabetes management self-efficacy scale.

*Paired t-test

Notes: Follow-up: Two months after.

In a case study, Vincent used King's theory in providing care to a client with self-image problem, and suggested that the implementation of the nursing interventions based on King's model increased the level of adaptive response in the client [27]. Another study observed significant adherence to the defined goals among diabetic patients after intervention [16]. These two studies concluded that King's theory can be well integrated into the family health strategy (FHS) program to achieve the expected goals. Bezerra et al. investigated nurses' perceptions of King's theory and observed that the conceptual model of interactive open systems developed based on King's theory provided adequate explanations about primary health care in hypertensive patients [28]. It seems that routine methods, which are not mainly patient-centered, are used in the care of patients in the current health system. This affects the quality of care, especially in chronic diseases where the patient's compliance with the treatment is poor, and the patient leaves the treatment after a while, and the symptoms re-occur. Therefore, using patient-centered and interactive methods can be a solution to this problem.

In our study, two months after the application of King's theory in a nursing program, the mean DMSES score in the intervention group was significantly higher than the scores of pre-test and post-test (two weeks after the intervention). This is along to the findings of a study in Iran where the behavior changes of diabetic patients were assessed before and four months after the intervention, and a significant increase in the mean self-efficacy score was reported [29]. However, application of a new intervention may not lead to positive outcomes. In a feasibility study, regular follow-up was done for 6 months by making frequent calls and insisting on regular visits for examination [30].

In King's nursing theory, the direct interaction between the nurse and the patient is emphasized, which indicates patients' participation in care plans. In this way, diabetic patients can receive information from the nurse and choose options according to their conditions. Therefore, the care program is designed and implemented based on the selected priorities of the patient, which can lead to more acceptance of and compliance with the care program in diabetic patients [31-33]. Nursing theories, although they provide very useful theoretical and prac-

Table 4. Test of within-subject effects for DMSES score

Source	Sum of Squares	df	Mean Square	F	P	η^2
Time	3446.1	1.43	2407.6	45.29	0.001	0.438
Time×group*	5143	1.43	3593.2	67.56	0.001	0.538
Error	4412.8	83	53.15	_	_	_

DMSES: Diabetes management self-efficacy scale.

*Greenhouse-Geisser correction.

tical frameworks in care, their effects on solving health system problems, quality of care, patient satisfaction, and reduction of health costs are still unknown, and the use of care models based on the interaction between the nurse and the patient has been neglected.

One of the limitations of this study was the low cooperation of the patients in the study because of the long intervention period. In this regard, the researchers tried to motivate them throughout the study by explaining the possible benefits of the study for the patients or by considering incentives for them. Based on the results, it can be concluded that a systematic care program based on King's theory can help diabetic patients identify their problems in the three human systems and find ways to achieve mutual nurse-patient goals. In addition, it can improve the self-efficacy of diabetic patients two weeks and two months after the intervention. Therefore, future studies are recommended to investigate the effect of this nursing care program on other patients to identify and solve their problems and challenges and pave the way for the application of nursing theories in routine clinical practice.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of the School of Pharmacy and Nursing, and the School of Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran (Code: IR.SBMU.PHARMACY.REC.1401.103).

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Authors' contributions

Conceptualization, investigation, and methodology: Seyedeh Narjes Mousavizadeh, Delshad Shahmohammadi, and Mahnaz Ilkhani; Formal analysis: Seyedeh Narjes Mousavizadeh and Delshad Shahmohammadi; Supervision: Seyedeh Narjes Mousavizadeh; Visualization, review and editing: Seyedeh Narjes Mousavizadeh, Delshad Shahmohammadi, and Mahtab Sattari; Final approval: All authors.

Conflict of interest

The authors declared no conflict of interest.

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